

APPLICATION FOR
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FOR
METHOD AND APPARATUS FOR
APPLICATION SHARING INTERFACE

BY

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1 TITLE OF THE INVENTION

2 METHOD AND APPARATUS FOR APPLICATION SHARING INTERFACE

3 FIELD OF THE INVENTION

4 This invention relates generally to an interface program for sharing an application
5 program between two or more computers and, more specifically, to an interface program
6 to an underlying conferencing program having an application sharing capability.

7 BACKGROUND OF THE INVENTION

8 Computer systems and associated peripheral devices are often operatively coupled
9 to one another to enable electronic communication. This involves a network such as a
10 local area network (LAN), a wide area network (WAN), a portion of the Internet, or any
11 combination thereof. Such computer systems conventionally comprise an operating
12 system such as UNIX including without limitation variants of UNIX, WindowsNT,
13 Windows98, Windows CE, and variants of Windows. Such computer systems further
14 include application programs. These application programs may reside on such computer
15 systems or may reside on one or more application servers for use on small computer
16 systems.

17 Some application programs allow a computer system user to contemporaneously
18 share electronic media with users of other computer systems ("application sharing").
19 This is conventionally referred to as, "What you see is what I see" (WYSIWIS). These
20 programs conventionally comprise some level of conferencing capability. Such programs
21 include without limitation NetMeeting from Microsoft Corp., Redmond, Washington, and
22 ProShare from Intel Corp., Santa Clara, California. NetMeeting and ProShare each
23 comprise an application sharing capability. WYSIWIS is a substantially real-time shared

viewing on separate computer systems. By "substantially real-time shared viewing," is meant WYSIWIS with some amount of propagation delay.

Unfortunately, these conferencing programs require knowledge on how to use them for conferencing and require knowledge on how to configure them for application sharing. For example, in NetMeeting, a document, if not already open, must be found and opened. This will open an associated application program. After which, NetMeeting must be found and opened. NetMeeting provides a capability of creating a list of names (a directory) or a list of numbers (speed dial list). So, either a name or a number is selected from a list for an instantiation of NetMeeting. After a connection is established, a share menu becomes available. The share menu lists open documents available for sharing. A presenter of a host computer system may then select a document to be shared with an audience member or members of a shadow computer system or systems. ProShare also requires knowledge of how to use it for conferencing and for sharing applications.

Accordingly, it would be desirable to enable a user to share applications without having to have any knowledge of an underlying application. Thus, an application-sharing interface is needed which is easier to use than those heretofore.

SUMMARY OF THE INVENTION

The present invention provides method and apparatus for an application-sharing interface. More particularly, an aspect of the present invention is an interface program for application sharing. This interface program facilitates application sharing by reducing prior art complexity associated therewith. In particular, this interface program allows application sharing to be minimally established by selecting one or more documents to be

shared and one or more participants with whom to share such one or more documents.

After which, connectivity and any associated activity is automatically initiated.

An aspect of the present invention are routines which facilitate application sharing. Another aspect of the present invention is a windows update routine which facilitates generating an application list of window titles. Another aspect of the present invention is event handling, which may be used to provide participant count information. Another aspect of the present invention are routines for storing and restoring configuration of an application-sharing event. Another aspect of the present invention is routines for adding, changing, and removing participant listings from a participant list, which facilitates such adding, changing and removing whether currently engaged in an application-sharing event or not. Another aspect of the present invention is a client-server system employing a server interface program for providing an application-sharing service.

These and other features, advantages, objects and embodiments of the present invention will become more apparent from reading the following Detailed Description of the Preferred Embodiments or by practicing the present invention.

DESCRIPTION OF THE DRAWINGS

The features of the present invention, as well as objects and advantages, will best be understood by reference to the appended claims, detailed description and accompanying drawings where:

FIG. 1 is a block diagram of an exemplary portion of an embodiment of a computer system in accordance with the present invention.

1 FIG. 2 is a block diagram of an exemplary portion of an embodiment of a network
2 in accordance with the present invention.

3 FIG. 3 is a block diagram of exemplary embodiments of application-sharing
4 processes in accordance with the present invention.

5 FIG. 4 is a flow diagram of an exemplary embodiment of a startup routine in
6 accordance with the present invention.

7 FIGS. 5A through 5C, inclusive, are pictorial diagrams of exemplary
8 embodiments of graphical user interfaces in accordance with the present invention.

9 FIG. 5D is a pictorial diagram illustratively showing a document icon dragged
10 and dropped onto a program icon to invoke a popup share view menu and a participant
11 list on a display in accordance with an exemplary embodiment of the present invention.

12 FIG. 6 is a flow diagram of an exemplary embodiment of an update routine in
13 accordance with the present invention.

14 FIGS. 7 and 8 are flow diagrams of exemplary embodiments of sharing routines
15 in accordance with the present invention.

16 FIGS. 9A through 9C, inclusive, are flow diagrams of exemplary embodiments of
17 event handling flows in accordance with the present invention.

18 FIGS. 10A and 10B are block diagrams of exemplary embodiments of routines
19 for saving and restoring a session, respectively, in accordance with the present invention.

20 FIG. 11A through 11F, inclusive, are pictorial diagrams of exemplary
21 embodiments of graphical user interfaces in accordance with the present invention.

22 FIGS. 12A and 12B are flow diagrams of exemplary embodiments of participant
23 list routines in accordance with the present invention.

FIG. 13 is a block diagram of an exemplary portion of an embodiment of a server-client network in accordance with the present invention.

In the drawings, same reference numbers refer to like components throughout the several figures.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

In the following detailed description, reference is made to the accompanying drawings which form a part of this detailed description, and in which, shown by way of illustrative example, specific embodiments are described. These exemplary embodiments are described in sufficient detail to enable those of skill in the art to practice the present invention. However, it is to be understood that other embodiments of the present invention not described herein in any detail may be utilized. Therefore, the following detailed description is not to be taken in a limiting sense.

Referring to FIG. 1, there is shown a block diagram of an exemplary portion of an embodiment of a computer system 100 on which an interface program 108 may be executed. Computer system 100 comprises bus 101, central processing unit (CPU) 102, memory 103, input/output devices 104. Memory 103 comprises operating system 106, application programs 107, one or more documents 113, conferencing program 112 and interface program 108. Though memory 103 is illustratively shown separate from CPU 102, a portion of memory 103 may be part of CPU 102. CPU 102, memory 103, input device 104 and output device 105 are illustratively shown operatively coupled via bus 101. Bus 101 comprises an address bus, a control bus and a data bus. Input device 104 may comprise one or more input devices, including without limitation a keyboard, a cursor pointing device, a scanner, a video camera, a microphone, and the like. Output

1 device 105 may comprise one or more output devices, including without limitation a
2 display device having a screen display, a printer, and the like. Input/output device 109
3 comprises one or more input/output devices, including without limitation a modem, a
4 network interface, and the like. Notably, many other well-know configurations may be
5 employed for computer system 100.

6 By way of example and not limitation, computer system 100 comprises at least
7 one operating system 106, such as UNIX including without limitation variants of UNIX,
8 WindowsNT, Windows98 or Windows CE including without limitation variants of
9 Windows, and any of a variety of applications for creating one or more documents. By
10 document, it is meant any electronic form of media, including without limitation an
11 electronic version of a spreadsheet, word processing text, picture, slide, video, audio, and
12 the like. Conferencing program 112 may be a conferencing program such as NetMeeting,
13 ProShare, and the like configured for application sharing.

14 Accordingly, it should be understood that any of a variety of operating systems,
15 application programs and conferencing programs may be used, so for purposes of clarity
16 a preferred embodiment employing a computer system having a Microsoft Windows98
17 operating system, Microsoft Word application program and Microsoft NetMeeting
18 configured for application sharing is described elsewhere. Microsoft's Windows98 and
19 NetMeeting provide an underlying infrastructure for manipulating and sharing
20 applications and for providing certain graphical user interface (GUI) elements. However,
21 other same or similar infrastructures may be used.

22 Referring to FIG. 2, there is shown a block diagram of an exemplary portion of an
23 embodiment of a computer network 110 on which interface program 108 may be

1 executed. By computer network, it is meant more than one computer system operatively
2 coupled to one another via one or more communication links 111. Communication link
3 111 may comprise any of a number of connection types, including without limitation
4 cellular, satellite, phone line, cable TV line, local area network (LAN), wide area network
5 (WAN), and the like. Computer systems 100B to 100N are shadow computer systems to
6 host computer system 100A. These shadow computer systems 100B to 100N have a
7 program, such as NetMeeting, ProShare, and the like, with an application-sharing
8 capability. Though host computer system 100A comprises interface program 108,
9 shadow computer systems 100B to 100N may or may not have it. Accordingly, it should
10 be understood that any of a variety of computer systems including any of a variety of
11 operating systems, application programs, and application-sharing programs may be used
12 for such shadow computer systems. So, for purposes of clarity, a preferred embodiment
13 employing at least one shadow computer system 100B having a Microsoft Windows98
14 operating system and Microsoft NetMeeting configured for application sharing is
15 described herein below. Accordingly, computer systems 100A, 100B and 100N are
16 compatible with one another for alternative invocations.

17 In FIG. 3, a block diagram of application sharing using interface program 108 is
18 illustratively shown. Interface program 108 minimally uses two user steps for invoking
19 application sharing; accordingly, in any order selecting one or more documents 120 and
20 selecting one or more persons 121. Notably, a set of documents or a set of persons may
21 be selected to avoid having to select individual documents or participants.

22 Because interface program 108 provides a separate interface from an underlying
23 conferencing application, application sharing without user knowledge of this underlying

1 conferencing program is facilitated by automatically initiating/establishing application
2 sharing 119, including without limitation substantially real-time shared viewing. In other
3 words, a conferencing program interface may be made "transparent" to a user.
4 Accordingly, interface program 108 may include a user selectable command to hide a
5 user interface for such an underlying conferencing program. Moreover, this leads to a
6 benefit of requiring fewer steps than previously required. Furthermore, as will become
7 apparent, establishing an application-sharing event while providing relevant status
8 information associated therewith is accomplished using a single status window.

9 Application Startup

10 Referring now to FIG. 4, there is shown a flow diagram of an exemplary
11 embodiment of a startup routine 130 in accordance with the present invention. Shown
12 are three separate approaches to initiate startup program 130. At "Run Interface
13 Program" 132, an executable version of interface program 108 may be conventionally
14 invoked, such as double-clicking on an executable file or typing at a command line. At
15 "Drop File on Interface Program" 131, a document file is dragged and dropped on an
16 interface program 108 icon. At "Select Interface Program" 133, an interface program 108
17 command option is selected from a popup menu activated by a "right click" of a cursor
18 pointing device on an object displayed on a screen display, such object may be part of a
19 "desktop" or file manager.

20 At decision "Interface Program Already Running" 134, a determination is made as
21 to whether a prior instantiation of interface program 108 is currently active.

1 If interface program 108 is currently running, then any subsequently attempted
2 initiation 131, 132, or 133 is exited at "Exit New Instance" 135. A user interface and
3 applicant list of this currently running interface program 108 is used.

4 If interface program 108 is not currently running, then at "Display GUI/Initialize
5 Window List" 136, an interface program 108 user interface, preferably a GUI, is
6 displayed having an application list. At "Update Status Indicators" 137, status indicators
7 are updated as needed to reflect a current state of any ongoing connections as described
8 herein below. This application listing may list one or more selectable documents or
9 windows titles. By way of example and not limitation, a GUI 141 having an application
10 list 145 with document titles is illustratively shown in the pictorial diagram of FIG. 5A.

11 At decision "File Selected" 140, it is determined whether a file from an
12 application list to be shared has been selected. If a file has been selected, then a popup
13 share view menu, and optionally a participant list, is opened at "Popup Share View
14 Menu" 138. By way of example and not limitation, a popup share view menu 142 and a
15 participant list 143 for a selected document file 146 is illustratively shown in the pictorial
16 diagram of FIG. 5B. If engaged in sharing an application, a "Stop Sharing" command,
17 shown in FIG. 5B, would be active, allowing a host user to stop sharing of a selected
18 document.

19 In an embodiment, by selecting one or more "Recipient(s)," "Group(s)" or "All" in
20 a participant list, sharing may be immediately initiated. "New" brings up an address book
21 for entering a new recipient to a participant list. Accordingly, such an address book has a
22 user selectable field for toggling between adding or not adding an entry to such a
23 participant list. "All" is active when sharing is ongoing, and allows a user to share a

1 selected application or document with everyone sharing after checking to see if such
2 application or document is already shared. If no connected call is ongoing, then a "Not in
3 a call" indicator appears.

4 If at decision "File Selected" 140 no file has been selected, then at "Raise
5 Running Application" 139 a user interface, for example GUI 141, is placed at the front of
6 a display as an active window.

7 Update Window List

8 Referring now to FIG. 6, there is shown a flow diagram of an exemplary
9 embodiment of update routine 150 in accordance with the present invention. Update
10 routine 150 is for generating a window list by filtering available windows and listing
11 those that appear to correspond to shareable objects. Update routine 150 may be used to
12 generate an initial list of shareable objects or may be used to update a list of shareable
13 objects.

14 Updating may be user configured with respect to update frequency. By way of
15 example and not limitation, a user may set update routine 150 to run every five seconds
16 in a background mode. Alternatively, an "Update List" command may be invoked from a
17 pull-down menu 144 as illustratively shown by way of example and not limitation in the
18 pictorial diagram of FIG. 5C.

19 Update routine 150 iterates through available windows, selecting and displaying
20 information for certain of them. More specifically, update routine 150 employs a
21 capability of an underlying operating system to iterate through information about each
22 window. This information may comprise a window's title, visibility (whether hidden or
23 not) and unique identification ("ID"). Additional information that may be obtained

1 includes a window's source (for example, local computer, networked computer, shared
2 view, or workspace) and if available, information about an associated file or application
3 program.

4 At decision "Available Window" 158, update routine 150 determines whether at
5 least one window is available for processing. If a window is available for processing,
6 information for such window is obtained at "Get Window Info." 157.

7 At "Ignore Window" 156, it is determined whether this obtained information is to
8 be ignored. A set of heuristics is used to determine whether to display information about
9 a window or document. By way of example and not limitation, a set of heuristics may
10 include:

- 11 • Window visible (system windows are conventionally hidden).
- 12 • Window title contains "-" (assumed to separate document and application
13 names.
- 14 • Document name precedes "-", application name follows (standard
15 convention).
- 16 • Some applications reverse this standard convention, so
 - 17 • if a document name contains "NetMeeting", "Exploring", "Microsoft"
18 or "Eudora", then document and application names are swapped unless
19 such document name also includes "Explorer".
 - 20 • if application name contains ":\\" (part of a pathname), then replace it
21 with just its root filename.

- 1 • Remove designated strings from application name. This may be user
- 2 configurable. An example of a string that a user may decide to remove is
- 3 "Microsoft".
- 4 • Do not list windows whose application name contains "Exploring" or
- 5 "NetMeeting". This may be user configurable.
- 6 • Optionally, add a filter, which may be user configurable, to avoid particular
- 7 document names or portions thereof.

8 If this window is to be ignored, then a check for another available window is
9 made at "Available Window" 158.

10 If this window is not to be ignored, then it is determined whether it is already
11 listed at "New Window" 155 by comparing unique ID's. If a unique ID is already on this
12 generated window list of shareable objects, then window information to be displayed may
13 be updated, if different, at "Update Information" 153. If a unique ID is not already on
14 this generated window list of shareable objects, then such object, including associated
15 information, is added to this generated window list at "Add to List" 154.

16 After adding at 154 or any updating at 153, an inquiry is made at "Available
17 Window" 158 as to whether there is another yet unprocessed window. If there is no other
18 as yet unprocessed window, update routine 150 exits at "Done" 159; otherwise, update
19 routine 150 continues at "Get Window Info." 157. Accordingly, update routine 150
20 continues until there are no more unprocessed windows.

21 A user may designate one or more windows to ignore. Moreover, a user may
22 designate whether to view information in such an application listing by title of shareable
23 window or document. In a window title list mode, windows are listed by window frame

1 title. In a document title list mode, documents are listed by document title, and a separate
2 column for an associated application may be included. While not wishing to be bound by
3 theory, it is anticipated that a listing by document title will be shorter and will be subject
4 to less inadvertent sharing. Inadvertent sharing may occur owing to designating an
5 "Explorer" window, such as "My Computer" or a folder, wherein all open windows will
6 be shared, or owing to starting a new application in a window while still in a meeting.
7 On the other hand, if a host user would like to share many documents at one time or to
8 add one or more documents during a conference, then an application list by window may
9 be desirable.

10 Planned Sharing

11 The terms "planned sharing" and "ad hoc sharing" as used herein refer to different
12 contexts in which an object is selected for sharing, namely, respectively when an object is
13 selected for sharing before it is opened and when an object is selected for sharing after it
14 is opened.

15 Referring now to FIG. 7, there is shown a flow diagram of an exemplary
16 embodiment of planned sharing routine ("PS routine") 160 in accordance with the
17 present invention. PS routine program 160 may be initiated by dropping one or more
18 files on an interface program 108 executable file, main window or icon, namely
19 invocations 161, 162 and 163, respectively.

20 With continuing reference to FIG. 7, an interface program 108 command may be
21 added to object menus at "Interface Program Command Added to Object Menus" 170.
22 Such addition may be done by "right-clicking" on a file on a Windows desktop, in
23 Windows Explorer, or in other similar locations having an "Open" command in a menu.

1 Accordingly, a command called "Share" may be added to such menus. Thus, PS program
2 160 may be initiated by right-clicking on a document object to invoke an object menu,
3 and then selecting a "Share" command from this object menu at "Select Share from
4 Object Menu" 171.

5 After initiating, a menu is provided at "Popup Share View Menu" 164. This menu
6 may popup at a location where sharing was initiated. By way of example and not
7 limitation, in FIG. 5D there is illustratively shown a document icon 176 dragged and
8 dropped onto a interface program icon 175 to invoke a popup share view menu 172 and a
9 participant list 143 on a host's screen display 174.

10 After "Popup Share View Menu" 164, a user may select one or more participants
11 from a participant list at "User Selects Participant" 165. Such a participant list may be
12 generated by accessing an address book, directory listing, speed dial listing, or the like.

13 As interface program 108 is invoked by effectively selecting a file or files to
14 share, any such selected files are loaded into their respective application program at "File
15 Loaded Into Application" 166.

16 At inquiry "Selected Participant Connected" 167, it is determined which, if any,
17 selected participants are not already part of any ongoing call. If there is no ongoing call,
18 then NetMeeting is activated and a call is made to a selected participant to attempt to
19 establish a connection at "Connect Participant" 169. If there is an ongoing call and a
20 selected participant is not currently part of that ongoing call, then a call is made to such
21 participant to attempt to establish a connection at "Connect Participant" 169. Information
22 for placing such a call may be found by accessing an address book, directory listing,

1 speed dial listing, or the like. If a selected participant is already connected, then they
2 may share a selected application at 168.

3 At "Share Application" 168 a participant list is updated and each participant
4 connected to a host computer may view any and all designated files for sharing.
5 Moreover, manner of sharing may be user designated, namely "shared viewing" or
6 "shared editing." By "shared viewing," it is meant that an audience member may view
7 but cannot edit a shared document. By "shared editing," it is meant that an audience
8 member may view and edit a shared document. In an embodiment, once shared viewing
9 is established, a host user may change status to shared editing. In an embodiment, an
10 indicator is placed in an upper left corner of a window to indicate it is shared along with a
11 host name.

12 Ad Hoc Sharing

13 Referring now to FIG. 8, there is shown a flow diagram of an exemplary
14 embodiment of "ad hoc" sharing routine ("AHS routine") 180 in accordance with the
15 present invention. A window is selected from a window list at 181. By way of example
16 and not limitation, in FIG. 11A there is illustratively shown a GUI 241 having a window
17 list 200. GUI 241 is similar to GUI 141 of FIG. 5A, except that window titles are
18 provided instead of document titles and no separate listing of application information
19 appears. Once a window is selected, a user may select to display that window as a front
20 image on a screen display at 182. If so, this selected window is moved in front of any
21 other windows on such a screen display at 183. By way of example and not limitation, a
22 "Bring to Top" selection may be part of a pull-down share view menu 242, as
23 illustratively shown in FIG. 11B.

1 If a selected window from a window list is not currently shared as determined at
2 188, a user may choose to "ad hoc" share such window by pulling down a share view
3 menu at 187 and then selecting with whom to share such window at 184. By way of
4 example and not limitation, a pull-down share view menu 242 and a participant list 143
5 are illustratively shown in FIG. 11B. Any selected participants may then be connected at
6 185, using connection information, as previously described herein, and an application
7 may be shared with any of these selected participants at 186.

8 If a selected window from a window list is currently being shared as determined
9 at 188, then a user may choose from several different actions at 191. If branch 195 is
10 selected, a user decided to share viewing with another participant. Accordingly, a user
11 may select with whom to share viewing at 189 and such selected participant may be
12 added to this ongoing sharing at 190, including establishing a connection. By way of
13 example and not limitation, a pull-down share view menu 242 and a participant list 243
14 are illustratively shown in FIG. 11C having ongoing shared viewing of a document as
15 indicated by an associated "Viewing" status indicator 244. Furthermore, a participant
16 counter 247, as illustratively shown in FIG. 11C, may be used to provide an indication of
17 two or more participants. Participant counter 247 may be incremented or decremented as
18 described elsewhere herein. Moreover, participant counter 247 may contextually indicate
19 other information associated with call placement, such as dialing, dialing number, calling,
20 busy, connecting, and the like.

21 Alternatively at select action 191, a user may decide to allow a participant to
22 share editing by selecting branch 196, and thus change status to shared editing at 193. By
23 way of example and not limitation, as illustratively shown in FIG. 11D, a pull-down tools

1 menu 246 and window listing 200 may have a command that is toggled between "Shared
2 Viewing" (illustratively shown in FIG. 11E) and "Shared Editing." In FIG. 11D, sharing
3 status of an ongoing call is indicated by an associated "Editing" status indicator 245.

4 Alternatively at select action 191, a user may select a "Stop Sharing" command
5 (illustratively shown in FIG. 11C) by selecting branch 194, and thus terminate sharing at
6 192.

7 Event Handling

8 Referring now to FIGS. 9A through 9C, inclusive, there are shown flow diagrams
9 of exemplary embodiments of event handling in accordance with the present invention.

10 As interface program 108 is interacting with an underlying communication system having
11 some asynchronous behavior, it is configured to respond to certain events, namely Call
12 Begins 201, Call Ends 202, User Added 203, User Dropped 204, Viewing Starts 205,
13 Viewing Stops 206, Editing Starts 207 and Editing Stops 208.

14 Prior to any ongoing call, if a host user begins a call 201, then participant count is
15 incremented at 211 and a participant list is updated at 212. If a host user ends a call at
16 202, then participant count is decremented at 210 and this participant list is cleared at
17 213. It should be noted that "sub-hosting" may be included. By "sub-hosting," it is
18 meant that if an audience member would like to add another entity to a meeting, they may
19 do so. Thus, such an audience member becomes a sub-host with respect to a host user.
20 Participant count is incremented or decremented, as applicable, on a participant list
21 whether originally included by a host or a sub-host.

22 For an ongoing call, if an audience member is added at 203, then participant count
23 is incremented at 211. If an audience member is dropped at 204, then participant count is

1 decremented at 210 and this participant list is updated at 212. An audience member may
2 be connected during an ongoing call using a "Call" command from pull-down tools menu
3 246 and a participants list 248 as illustratively shown in FIG. 11E. Moreover, a "Show
4 Participants List" command may be invoked to show a list of participants in a meeting,
5 including any additional information from a respective address book entry, as
6 illustratively shown as participant list 249 in FIG. 11F.

7 If viewing starts at 205 or stops at 206, then a window or document list is updated
8 for any and all selected shared viewing of items on said list.

9 If editing starts at 207 or stops at 208, then a window or document list is updated
10 for any and all selected shared editing of items on said list.

11 "Snapshots"

12 Referring now to FIGS. 10A and 10B, there are shown block diagrams of
13 exemplary embodiments of session saving routine 220 and session restoring routine 230,
14 respectively. By "snapshots," it is meant an ability to save an in-process meeting context.
15 By saving such a context, settings for subsequent same or similar meeting contexts may
16 be initiated therefrom. Accordingly, a snapshot application-sharing meeting
17 configuration contains addresses of meeting participants and descriptors of any and all
18 shared windows or documents, which may include associated shared editing or viewing
19 status information. A snapshot application-sharing meeting configuration may be saved
20 using interface session saving 220 and subsequently restored using interface session
21 restoring 230.

22 At 229, a user selects a "Save Snapshot" command. This command may be in a
23 pop-up menu, a pull-down menu, or the like. At 221, a user inputs a name to save a state

1 of an ongoing application-sharing meeting configuration. At 223, address information
2 for each active participant is saved, and at 224 descriptors of any and all shared
3 applications are saved for each application involved. This selected name is then saved to
4 its associated application-sharing meeting configuration at 226, which may include
5 saving such name to a menu.

6 Address information saved at 223 may include a network address, including
7 without limitation an Internet Protocol (IP) address. An address book may be configured
8 with a field for entering other address information, as well as a field for selecting whether
9 an entry is to be added to a "Share View With" menu, or more particularly a participant
10 list. This other address information may comprise one or more fields for a telephone line
11 number, data line number or other number that may be used for establishing data
12 communication with an application-sharing recipient.

13 To restore a snapshot, a user selects a "Restore Snapshot" command at 219. This
14 command may be in one or more same menus as a "Save Snapshot" command. At 218, a
15 list of available names of snapshots is displayed. This list may be displayed as a
16 submenu to a menu associated with a "Restore Snapshot" command. A name associated
17 with a saved snapshot is selected at 231. Selecting such a name may be automated by
18 employing a well-known calendar or task-scheduling program.

19 At 233, address information associated with one or more participants is read from
20 a stored application-sharing meeting configuration associated with such a selected name.
21 A connection, or at least attempted connection, is invoked for each of these participants,
22 or at least potential participants, at 234. Descriptors are read from such select
23 application-sharing meeting configuration at 235. These descriptors include information

1 regarding shared windows from prior sharing, including any state information. A search
 2 is conducted for matching windows at 236, namely a search is conducted using these
 3 shared window descriptors to determine if any of them are already open. Windows that
 4 are currently open and match such a descriptor are then shared at 236. For those
 5 unmatched shared window descriptors, if any, corresponding files and applications may
 6 be opened, or at least attempted to be opened, at 237 and then shared at 238.

7 Address Book

8 Referring now to FIG. 12A, there is shown a flow diagram of an embodiment of a
 9 participant list routine 250. Participant list routine 250 may be used to add or update a
 10 participant list associated with a "Share View With" menu or a Call menu. Participant
 11 list routine 250 facilitates adding new participant listings during an ongoing application-
 12 sharing activity. Moreover, participant list routine 250 may be employed to access
 13 information from another directory source of information, such as LDAP, Outlook, and
 14 the like, including without limitation corporate directories.

15 At 269, a "Name" and an associated "Address" is inputted for routine 250. This
 16 "Name" is to appear as a "Menu Item" in a menu. Selecting a "Menu Item" associated
 17 with this "Name" causes "Address" to be used to ensure a named participant is in a call.

18 At 251, a "Use Item" is set equal to a "Menu Item." This "Use Item" comprises a
 19 name and a network address, and each active "Menu Item" in an array of Menu Items
 20 comprises a name and a network address, as illustratively shown in Table I. Preferably,
 21 such a network address is an Internet Protocol ("IP") address.

22 Table I

0	Name A	Address A
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1	Name B	Address B
2	Name C	Address C
3	Inactive	Inactive

1

2

3 At 251, Use Item is initialized to Menu Item(0). If necessary, Use Item is set to
4 successive members of Menu Item in an attempt to find an unused existing menu item.

5 At 252, it is determined whether Use Item is currently in use. By way of example
6 and not limitation, a Use Item is currently in use if it is visible in a participant list menu.

7 If it is determined that such Use Item is not currently in use, then this Use Item is reused
8 or recycled by setting Use Item name equal to Name at 262 and Use Item address equal
9 to Address at 263, and enabling this Use Item at 264. By way of example and not
10 limitation, a Use Item is enabled if it is visible in a participant list menu.

11 If at 252, it is determined that a Use Item is currently in use, then this Use Item is
12 set to have a Null value or other flag at 253. At 254, a current Menu Item address is
13 checked against Address. If these addresses are equal, then this current Menu Item is
14 updated with Name at 255.

15 If at 254 a Menu Item address is not equal to Address, then at 257 it is determined
16 if this current Menu Item is currently being used. If it is currently being used, then at 259
17 a check is made to determine if it is the last Menu Item. If it is not the last Menu Item, a
18 Next Menu Item is obtained at 258 to repeat this process beginning at 254.

1 If a Menu Item at 257 is currently not being used, then at 265 a Use Item is set
2 equal to this Menu Item. At 262 and 263 a name and a network address for this Use Item
3 is put in this previously established but available Menu Item.

4 If a Menu Item is currently being used and is the last Menu Item, then at 260 a
5 check is made to determine if this Use Item equals a Null value.

6 If at 260 Use Item is not Null, then it is equal to an existing but unused Menu
7 Item. So, at 262 and 263, Use Item name and address are updated with Name and
8 Address, respectively. At 264, Use Item is enabled, making this inputted Name visible in
9 a participant list menu.

10 If at 260 Use Item does equal a Null value, then at 261 a new menu item is added
11 to the Menu Item array. Use Item is set equal to this new menu item. At 262 and 263,
12 Use Item is updated with Name and Address, as previously described, and then enabled at
13 264.

14 Referring now to FIG. 12B, there is shown a flow diagram of an embodiment of a
15 participant list routine 270. Participant list routine 270 is used for inactivating a Name
16 and an associated Address, such as a network address, from a Menu Item array. At 279,
17 an Address, and optionally a Name, to be removed is inputted. At 271, a determination is
18 made as to whether a Menu Item has the same address as Address. If yes, then this Menu
19 Item is disabled at 273. If no, then a check is made to determine if this Menu Item is the
20 last Menu Item at 275. If it is not the last Menu Item, then at 274 a Next Menu Item is
21 obtained and this routine 270 begins again at 272. If it is the last Menu Item at 275, then
22 this routine 270 exits.

23 Server-Client

Referring now to FIG. 13, there is shown a block diagram of an exemplary portion of an embodiment of a server-client network 290 in accordance with the present invention. A server interface program 288, namely a server version of interface program 108, is employed in a call manager 280. Call manager 280, apart from server interface program 288, is well known in telecommunications. Call manager 280 manages calls of clients 284, 285 and 286, which may be respective computer systems as described elsewhere herein, including calling one or more clients, and maintaining and updating connection status information associated therewith. Server interface program 288 in cooperation with call manager 280 uses such information to provide a participant list as described elsewhere herein. Server interface program 288 provides an interface, such as GUI 141, to those clients involved in application sharing. Alternatively, server interface program 288 may be part of client 286. Server program 288 in this alternative embodiment may initiate placement of calls from server-client 286 to clients 284 and 285 for application sharing as described elsewhere herein.

Although the present invention has been particularly shown and described with respect to certain embodiments thereof, including without limitation a best mode if any, it should be readily apparent to those of skill in the art that various structural, logical, electrical, and other changes in form and detail may be made to these embodiments without departing from the scope of the present invention as set forth in the appended claims. Accordingly, the present invention is defined only by the appended claims that follow this detailed description.